

# **EXHIBIT S**

**REDACTED VERSION OF DOCUMENT  
SOUGHT TO BE SEALED**

# Grenada ORT MTBF Trigger

## (SSO # KOR-0187)

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Feb 7 , 2012



# Grenada Disty / OEM ORT Trigger

## Background :

W31 ORT report MTBF at 107K vs 250K Disty / OEM requirement. Major failures are Degraded head (9 drives) , NMD (5 drives) and Skip write (5 drives). This impacts to Disty / OEM Native capacities , not 2TB BtC.

## Observations :

- Aperio media can meet 250K MTBF. However , Grenada Aperio is planned for 10% supply only.
- Head degradations (9 drives) :
  - 5/9 can be captured with new ET combo spec and ISI spec.
  - 1/9 showed symptom of head failure on the 1<sup>st</sup> run. This require head and media replacement for EC10504.
  - 1/9 can be captured by drive parameter MAX\_JUMP > 140.
- NMD (5 drives) :
  - 1/5 was with TGA reclaim. Reclaim TGA showed high failure rate at 3.9% vs Prime at 0.4-0.6%.

## Impacts (total 2M drives).

- FGI : 398K (35K Korat , 94K Wuxi and 269K SuZhou).
- WIP (as of Feb 6) : 1569K (131K Korat , 335K Wuxi and 1103K SuZhou).

## Supply :

- Under review.

# Grenada Disty / OEM ORT Trigger

## Actions :

- Issue stop ship to contain Disty / OEM Native drives all capacities at WIP and FGI / Feb 4 [Done]
- Review for paper sort criteria for drive WIP and upstream WIP
  - Paper sort criteria as of Feb 8 is accepted to release Disty and OEM drives on hold / Feb 8 [Done].
  - Total reject rate from drive and ET / ISI spec based on 1-2 sample sizes per capacity is 6% / 15% / 27% for 1TB / 2TB / 3TB (3% / 6% / 18% for drive criteria and 3% / 6% / 9% for HGA and ISI spec). Details in the backup / Feb 8 [Done].
  - Working for SBS demand to absorb Disty / OEM paper sort failures / On going
- Head degradation upstream spec tightening / Feb 9
  - Cut in a new ET combo spec / Feb 6 [Done].
  - ET yield impacted by 1.6%. Review tester impacts and on hold as a new sort and discuss usage strategy / On going.
  - Slider to cut in a new spec by Feb 9. Under PCA sign off and PG comes back from holidays.
- NMD reduction plans.
  - Review to cut in PCO17.3A (new MQM) / Feb 9.
  - JIT 3 F3 code / Feb 10 (under SIE / Reli testing).
  - New servo code / Feb 14 (under SIE / Reli testing). Require the code for factory check out by Feb 10.
  - Stop using TGA reclaim / W23 [Done]
  - Determine qualification plans for TGA reclaim both MPT and NHK / W32.
- Change ADG rules for EC10504 from B2 to B3 / Feb 6 [Done]
- Need more FA on the remaining failures / On going.
- Review ORT AFR vs Field return and pareto / On going.
- Disposition changed for 1D Alphana MBA to use for SBS only / Feb 8 [Done]
  - Working to use -303 , current 1D Alphana Disty , for SBS. No re-config required / On going

# BACK UP

Frank M / Brent V / Krishnan S / Pat D

# Actions from 2/6/12 Call

1. FGI degraded head screen implementation Update – Factory
2. Updated fix effectiveness with changes on Slide 4 – Reliability
3. Updated warranty reserve to reflect 154k MTBF – Reliability
4. [REDACTED] OEM shipment support (percent Prime + PCO 17.3A) – Factory
5. Confirmation of Alphana 1D use on SBS only – Reliability
6. Impact of Alphana 1D FGI to SBS only - Factory
7. Plan to close to SAD launch performance levels – Core Team
8. 8D on Grenada ORT SSO – Core Team
9. Long-term degraded head specification implementation – Factory
10. Inventory assessment of 20A material – Factory
11. Pharaoh ORT/Field performance vs. Grenada ORT/Field performance – Reliability

Release SSO – Korat ODT/Factory/Reliability

SSO Clearing Actions

1. FGI – apply slide 4 head screen + FE table actions on Slide 9.
2. WIP – apply slide 4 head screen + FE table actions on Slide 9.
3. New build – HGA specification (complete), Slider specification (2/9/12), PCO 17.4

# Updated Summary of Changes: GOTF Changes for PCO17.4 – Feb 6

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SN	PFL#	Failing Head	Symptom	ttf (hrs)	HD_SN	Proposed Screening Location	Proposed Screen(s)	Yield Impact at Location	Cut-In Date (Tentative)
S1D0HH3Y	PFL-3305	1	Head Instability	53.7	AL50BIFOV1	ET	WIJITA(15 max)+SGRNH_F3(1700 max)	0.08%	Expect STTH cut-in on Feb 7
S1F04WRR	PFL-3299	5	Head Instability	62.6	AL50MFHJL0				
W1D0C9W4	PFL-3355	1	Head Instability	295.3	AL509CQB11				
W1D09BNP	PFL-2954	1	Degraded Head	297.2	AL507PHKJ1	ET Drive CERT	TP_NLUMP(20 max) RAW_ERROR_RATE<2.1	0.07% ~1%	Expect STTH cut-in on Feb 7 Paper Sort + PCO17.4
W1D0CA1T	PFL-3388	1	Degraded Head	162.3	AL50EF73X1	ISI Drive CERT	SMAN_AMP_MAX > 1700 and SMANMAX_MAX_MAX > 2100 RAW_ERROR_RATE<2.1	0.39% ~1%	Expect PNG cut-in by Feb 9 Paper Sort + PCO17.4
W1E04V4X	PFL-3125	1	Degraded Head	151.5	AL50PNYTH1	ET Drive CERT	TP_PLUMP(-2min) + CTQ_NORM_NSE(0.13max) RAW_ERROR_RATE<2.1	0.38% ~1%	Expect STTH cut-in on Feb 7 Paper Sort + PCO17.4
Z1FOC5DK	PFL-3162	5	Degraded Head	411.8	AL506GQ9J1	ET Drive ADG	TP_PLUMP(-2min) + TCO_SLN (2.2 max) Possibly prevent reCERT for EC10504 along with other potential ECs	0.23% None	Expect STTH cut-in on Feb 7 Drive PE Team working Issue
Z1FOCM95	PFL-3094	2	Degraded Head	98.7	AL50GA1IT1	Drive CERT	MAX_JUMP>140 in P135_AGC_BASELINE_JUMP for ACTIVE_HEATER=W	~1%	Paper Sort + PCO17.4
Z1FOELHT	PFL-3232	1	Degraded BER	56.0	AL50I2ASZ1	Drive CERT	DELTA_BURNISH_CHECK>5 in P_AFH_DH_BURNISH_CHECK for ACTIVE_HEATER=R and STATE_NAME+AFH3 and TEST_TYPE=BURNISH	~0.19% head-level drive fallout	Paper Sort + PCO17.4

- Fixed an error in the HGA ET coverage. The spec was tabled under the wrong PFL #.
- Implementation of GOTF changes for ORT degraded heads issue in PCO17.4.
  - Raw BER Spec in P\_FORMAT\_ZONE\_ERROR\_RATE.
  - Max\_Jump Spec in P135\_AGC\_BASELINE\_JUMP.
  - Burnish Spec in AFH3.
- Between all specs (ISI, ET, Drive, ADG), we have coverage on 7 failures.
- Additionally investigating a potential anomaly/interaction between VBAR and AFH in PFL-3299.
- LCO focus will shift to PCO17.4 implementation with the improvements outlined above.

# ORT Fix Effectiveness

Failure Mode	FE%	Comments / Requirements
Degraded / Unstable Heads	68%	7 of 9 failures caught with Upstream + Cert specs. Spec criteria must be permanently made in a PCO and/or upstream spec
1D Alphana	100%	1D / Alphana restriction to SBS
NMD	0%	Assume no
Timeout / IOEDC Error	100%	Based upon agreement that this failure mode is not a customer issue
NMD - Reclaim TGAs	77%	Based upon Suzhou/Korat input.

**154k (1.54%)**

# Head Degradation failure rate analysis

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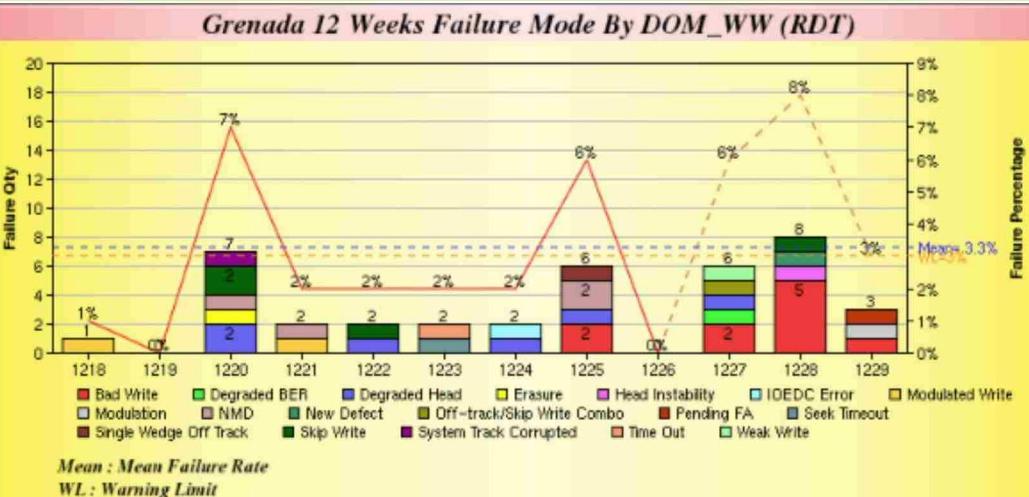
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Proposed Screen Location																		
ORT 9x failure					Drive level			ET level		ISI level		Final screen level	1TB (simulation) % Drive Impact	2TB (simulation) % Drive Impact	3TB (simulation) % Drive Impact			
Cap	SERIAL_NUM	PFL#	Fail_Hd	SYMPDTOM	ttf(hrs)	HD_SN	Criteria	1TB %Rej	2TB %Rej	3TB %Rej	Criteria	%Rej	Criteria	%Rej				
1TB	S1D0HH3Y	PFL-3305	1	Head Instability	53.7	AL50BIF0V1					WIJITA(15max)+ (V23)SGRNH_F3(1700max)	0.08%			HGA	0.0%	0.0%	0.4%
1TB	W1D0C9W4	PFL-3355	1	Head Instability	295.3	AL509CQBI1									-	-	-	-
1TB	W1D09BNP	PFL-2954	1	Degraded Head	297.2	AL507PHKJ1	RAW_BER<2.1 (P_FORMAT_ZONE_ERR OR RATE)	3.0%	9.0%	18%	TP_NLUMP(20max)	0.07%			HGA	0.6%	1.6%	2.5%
1TB	W1D0CA1T	PFL-3388	1	Degraded Head	162.3	AL50EF73X1	RAW_BER<2.1 (P_FORMAT_ZONE_ERR OR RATE)	3.0%	9.0%	18%			SMAN_AMP_AVG > 1700 and SMAN_MAX_MAX > 2100	0.39%	SLIDER	0.4%	1.5%	2.1%
3TB	S1F04WRR	PFL-3299	5	Head Instability	62.6	AL50MFHJL0	-	-	-									
3TB	Z1FOC5DK	PFL-3162	5	Degraded Head	411.8	AL506GQ9J1					TP_PLUMP(-2min) + TCO_SLN(2.2max)	0.23%			HGA	0.2%	0.0%	0.4%
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3TB	Z1FOELHT	PFL-3232	1	Degraded BER	56	AL50I2ASZ1	DELTA_BURNISH_CHECK K<-5 (in P_AFH_DH_BURNISH_C HECK for ACTIVE_HEATER=R,STA TE_NAME+AFH3,TEST_T YPE=BURNISH)	0.9%	0.4%	1.2%					DRIVE	0.9%	0.4%	1.2%
2TB	W1E04V4X	PFL-3125	1	Degraded Head	151.5	AL50PNYTH1	RAW_BER<2.1 (P_FORMAT_ZONE_ERR OR RATE)	3.0%	9.0%	18%	TP_PLUMP(-2min) + CTQ_NORM_NSE(0.13max)	0.38%			HGA	0.5%	1.8%	2.2%
** simulation from some SBR										Combine criteria		2.6%	5.4%	9.1%				
										Total Qty FNC2 passer drive		1415	2411	1040				

## RDT issue

- Degraded Head (8x), failure rate: 0.55%
- Root cause: 1. Degraded Head from 20A DLC Heads; 2. Degraded Head from 22A DLC head with PCO16.2, unstable head from BP4.5/22A
- CA: 1. 22A DLC; AFH 35.3; AFS 8.2 New SER Spec in PCO 12.7 for the 20A Heads; 2. HMRB9.7B (25% cut in WW06); GOTF Opportunity (PCO17.4 - WW37); Upstream ISI/ET Opportunity (WW34)
- Cut in date: 1. 100% 22A DLC head plan to implement in DOM1231.
  
- NMD(5x), failure rate: 0.44%
- Root cause: Contamination
- CA: MQM Tuning (WW33); Servo code changes (WW35); Cleanliness builds results (WW36); Factory particulate cleanup (WW34)
  
- Bad Write(10x), failure rate: 0.83%
- Root cause: Bad Write due to Poor preamp precomp OPTI picks.
- CA: PCO17.3. Based on OEM RDT TI PFLs that have been fix validated. PCO17.3 cut in on Jan27 for all sites.

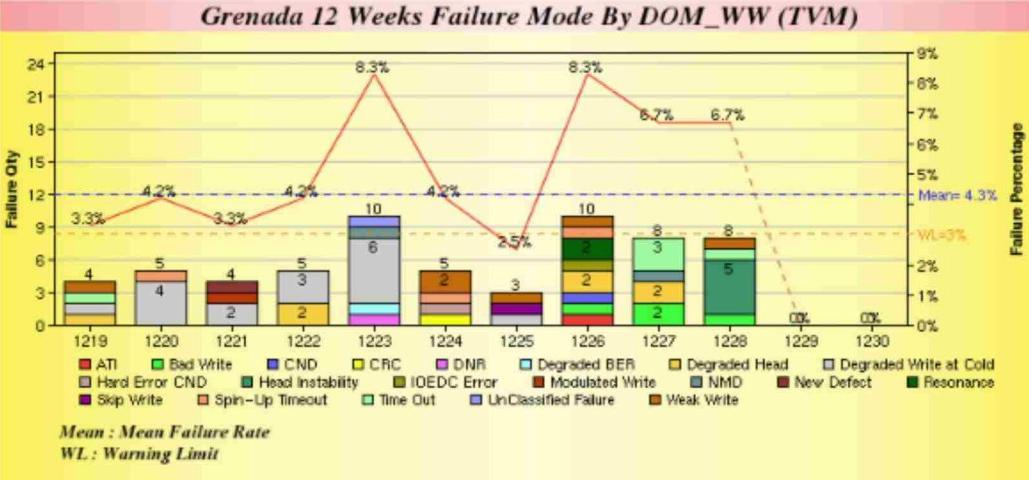
## RDT Chart



## TVM issue

- Degraded Write at cold(17x), failure rate: 1.3%
- Root cause: 1. failures from PCO12.7 found poor HMS capacity at CAL2; 2. failures with PCO16.2 under further FA
- CA: 1. Using VBAR by HMS in PCO16.2 to close failures with PCO12.7, some of the failures were shipped to LCO for futher FA
  
- Head Instability(6x) and Degraded Head(8x), failure rate: 1.0%
- Root cause: Unstable head from BP4.5/22A
- CA: HMRB9.7B (25% cut in WW06); GOTF Opportunity (PCO17.4 - WW37); Upstream ISI/ET Opportunity (WW34)

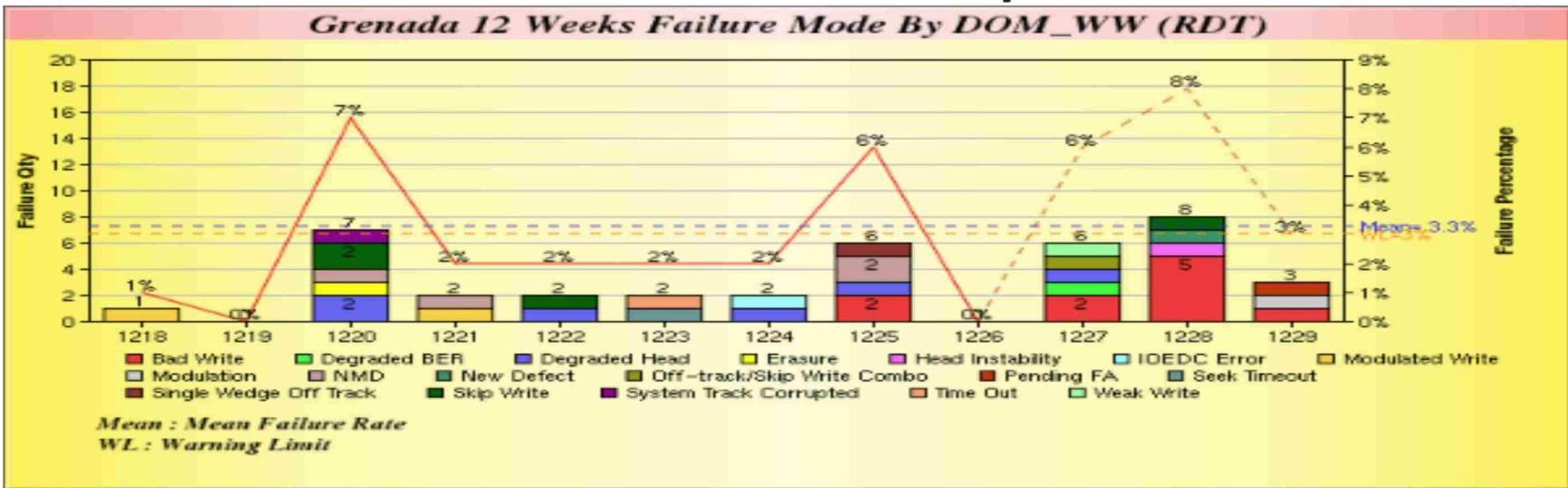
## TVM Chart



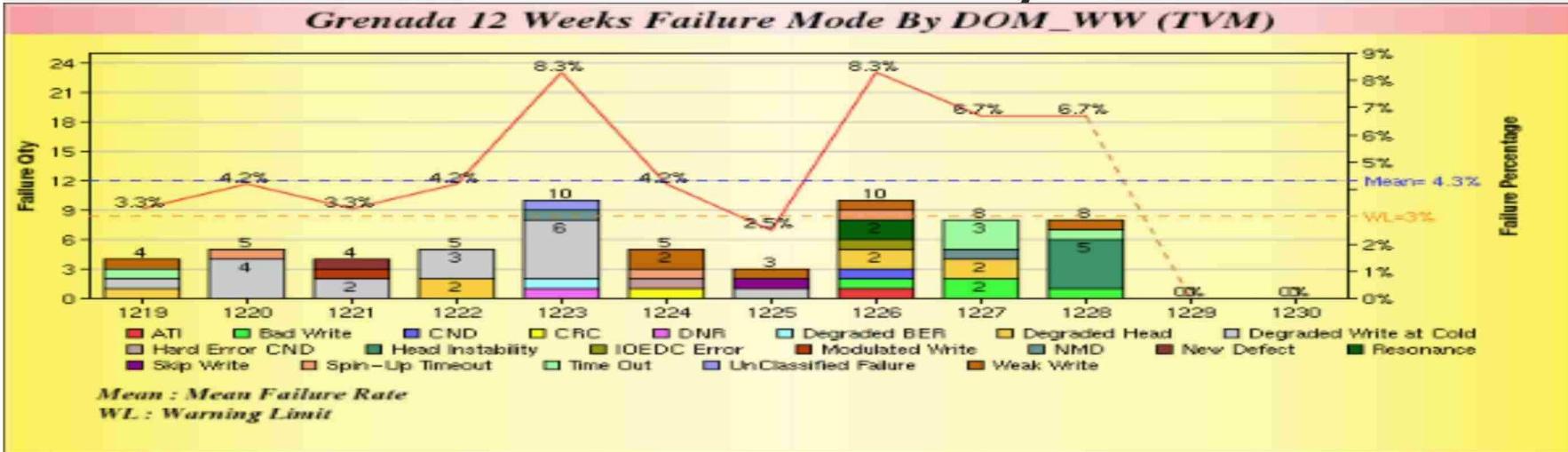
## PDMT no issue

# Grenada RDT 12wks Failures by DOM\_WW

Grenada 12 Weeks Failure Mode By DOM\_WW (RDT)

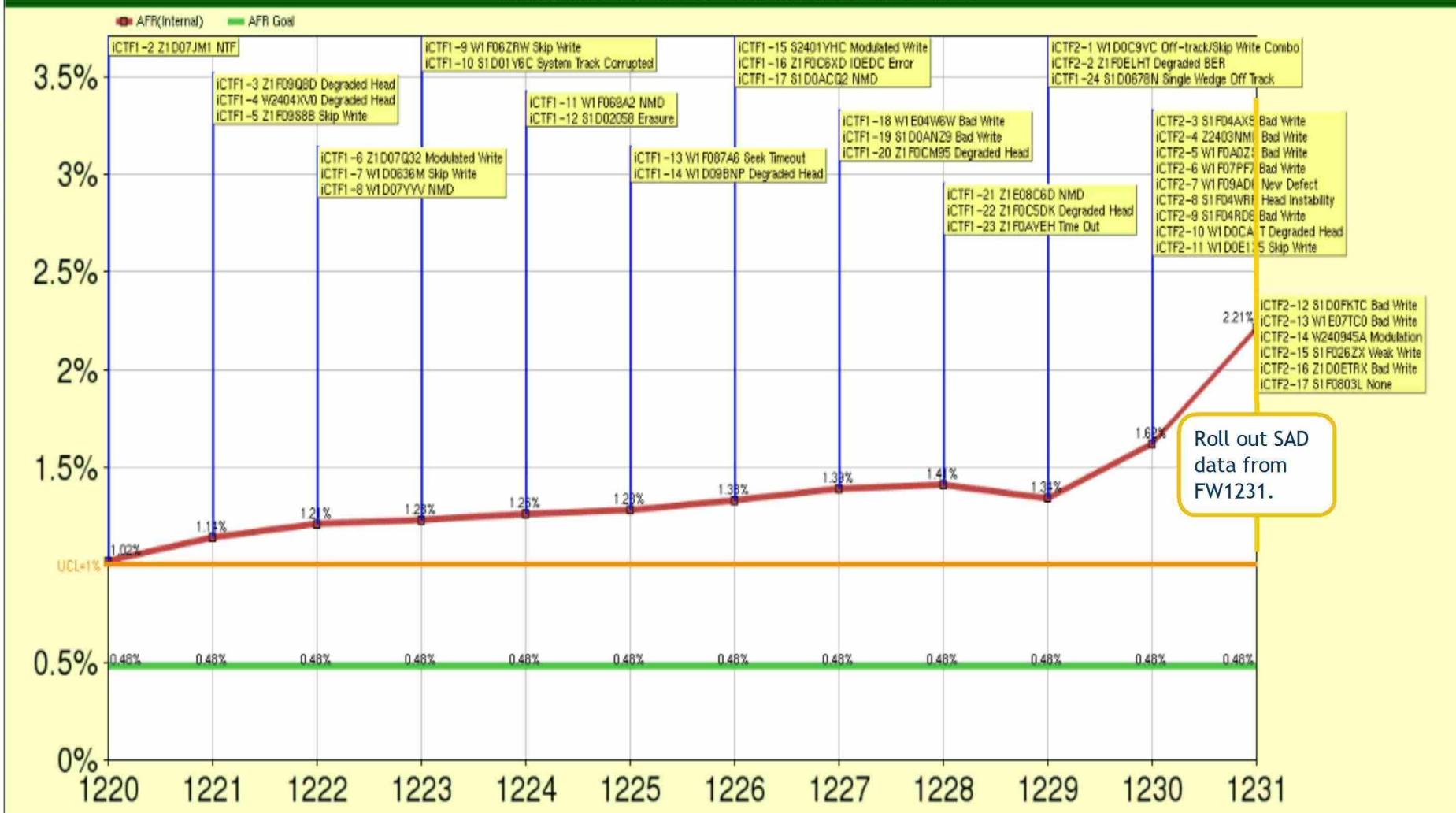


1. RDT failure rate trigger in DOM1220, no drives in FGI and WIP when trigger, no SSO. 2x Degraded Head from 20A DLC head, CA: 22DLC head; 2xSkip Write and 1xEasure, CA: PCO17.2; 1xNMD, drive was torn down without DC mark; 1xSystem Track Corrupted FA in LCO.
2. RDT failure rate trigger in DOM1225, pending follow up. 2xBad Write due to Poor preamp precomp OPTI picks, CA: New Preamp Opti in PCO 17.3; 2xNMD, PFL-3061/3137, MSL completed, pending LCO review; 1xDegraded Head(PFL-3094), pending further FA in LCO; 1xSWOT(PFL-3297), pending further FA.
3. RDT failure rate trigger in DOM1228, pending follow up. 2xBad Write due to Poor preamp precomp OPTI picks, CA: New Preamp Opti in PCO 17.3; 1xHead Instability(PFL-3299); 1xWeak Write(PFL-3303); 1xNew Defect(PFL-3298) pending LCO Review and 1xpending 1<sup>st</sup> level FA(PFL-3365)
4. RDT failure rate trigger in DOM1227 , pending follow up. 1xOff-track/Skip Write Combo, 1D Alphana, CA: 2xBad Write due to Poor preamp precomp OPTI picks, CA: New Preamp Opti in PCO 17.3; 2xDegraded Head(PFL-3232/3388), CA: HMRB9.7B (25% cut in WW06); GOTF Opportunity (PCO17.4 - WW37); Upstream ISI/ET Opportunity (WW34); 1xWeak Write(PFL-3393), drive ship to LCO for further FA on 2/3/2012.
5. RDT failure rate trigger in DOM1228 , pending follow up. 5xBad Write due to Poor preamp precomp OPTI picks, CA: New Preamp Opti in PCO 17.3; 1xHead Instability(PFL-3299), CA: HMRB9.7B (25% cut in WW06); GOTF Opportunity (PCO17.4 - WW37); Upstream ISI/ET Opportunity (WW34); 1xSkip Write(PFL-3365), CA:PCO17.2+; 1xNew Defect(PFL-3298), Pending MFA and MSL.

**Grenada TVM 12wks Failures by DOM\_WW****Grenada 12 Weeks Failure Mode By DOM\_WW (TVM)**

1. TVM failure rate trigger in DOM1223 due to high failure rate of degraded Write at cold, on hold drives with PCO12.7 in FGI and WIP in all 3x sites and re-cert with PCO16.2(VBAR by HMS); PCO 17.3 with new feature TCS is designed to fix failures with PCO16.2. PCO under check out.
2. TVM failure rate trigger in DOM1226, SSO Wuxi drives of this week in FGI and WIP(WUX 0081) due to higher failure rate (11.7%, 7 failures out of 60 Wuxi drives). 1xWeak Write due to poor HMS with PCO12.7, CA: PCO16.2(VBAR by HMS); 2xBad Write due to Poor preamp precomp OPTI picks, CA: New Preamp Opti in PCO 17.3; 1xWeak Write with PCO16.2, CA: Default TCS in PCO17.3; 1xResonance, Tail tack issue See similar issue in PFL-2814, CA: on the HGA line should be driven by process team; 1xIOEDC Error retest pass; 2xCND pending to retest; 1xATI, 1/24 drive arrived in LCO for RC investigation; 1xSpin up Time Out, pending LCO servo team to do further FA.
3. TVM failure rate trigger in DOM1227 , no trigger excluding Time out and Bad Write. 3xTime Out, PFL-3235/3236, pending retest/ PFL-3309, pending LCO review; 2xBad Write(PFL-3267/3246) due to Poor preamp precomp OPTI picks, CA: New Preamp Opti in PCO 17.3; 1xNMD(PFL-3202), pending ship to Wuxi to teardown and get 360 degree candella; 2xDegraded Head(PFL-3241/3282), FA in LCO;
4. TVM failure rate trigger in DOM1228, pending follow up. 1xTime Out, PFL-3308, pending LCO review; 1xBad Write(PFL-3357) due to Poor preamp precomp OPTI picks, CA: New Preamp Opti in PCO 17.3; 5xHead Instability(PFL-3307/3358/3373/3374/3377 /3378), pending LCO review; 1xWeak Write(PFL-3378)

## Grenada SS ORT Internal AFR Trend



MTBF based on 12 weeks' normal ORT loading , the MTBF is 107,378hrs.

- FA on unstable and degraded hga's indicates 5/9 failing heads can be caught with slider and hga spec changes. New TSR for HGA test on line by 2/7 in Korat. 2/9 for ISI spec change in Penang. Criteria can be applied for sorting WIP and FG for hga's and or drives. (criteria attached). More data on Monday 2/7, looking for any other sort criteria or cert screening data.
- Strong correlation to NMD and reclaimed TGA's. DQ'ed reclaimed TGA's effective WW23. Reli to define FE opportunity going forward with this factor removed.
- New MQM from PCO 17.3A available now. Could be implemented 2/6. NMD's occur at hours greater than MQM run time. Reli/Engr to define any FE opportunity.

- FA from Feather and ORT/ODT NMD's indicate large high frequency PZT commands can occur in current code. These have been proven to create NMD. Code fix in test over the weekend. Available 2/8-10 for release. Estimate 30+% reduction in NMD's
- Strong correlation to NMD and JIT mode. JIT 0 vs JIT 3 differences under investigation by Servo team. This correlation may be effected by fixes addressed above. Evaluating opportunity for JIT3 mode in Disty until root cause is closed with JIT 0 seeks, performance data and JIT 0 characterization by 2/8-10. Estimate 30%+ reduction in NMD's.
- Particle reduction efforts in progress. Details captured in later slides. BOB builds delayed until WW35-36. Estimate 20% reduction in NMD's with numerous improvements.

# ORT / TVM Pareto

QTY	Symptom	ORT PFLS, ttf	TVM PFL's, TTF, T
10	Bad Write	N/R	
9	Degraded heads	2954, 297 3094, 98 3162, 411 2643, 13 2664, 48 3001, 122 3000, 311 2789, 71	3182, 115 hrs, 0C 3141, 65hrs, 60C 2914, 258 hrs, 25C 2872, 173hrs, 0C
8	NMD's	2721, 4 3061, 5 3137, 222 3298, 55 2835, 439 3254, 261 3230, 9 3126, 157 3012, 399 3379, 172	3202, 8hrs, 27C 3014, 167hrs, 60C 2750, 19 hrs, 25C
5	Skip writes	N/R	3057, .8hrs, 25C 2682, 86 hrs, 0C
3	Instability	3299, 62 3305, 53 3310, 17	3307, 64hrs, 60C 3377, 190hrs, 60C 3241, 93hrs, 60C
3	Modulated Write	2663, 379 3010, 548 2814, 13	2763, 76hrs, 0C 3183, 116hrs, 0C 3135, 36hrs, 25C
15	Degraded write at cold, PCO16.x		

FA team working component analysis.

RHO F/A (including upstream analysis), has consistently shown the fix to be HMRB9.7+. Scott Deits to provide update.

FA team to provide detailed failure summary to the NMD team – head, zone, TTF, build week, suspension vendor, reclaim, prime/rework.

Skip writes improved from PCO12.6 to 16.2 (which has SWD in run-time). PCO17.3 has better tuning. CO17.3 RDT and TVM to date have no SW failures. FA team working on presenting FE data to Reli.

Instability failures are usually also degraded (changed from cert). FA team working to categorize which PFL's changed from cert.

Varyt pack: tail tack (~8Khz), Alphana, 47kHz.

PCO17.4 contains THS.

# Cleanliness Build Overview

## Best Practices Cleanliness Builds

- **5 weeks of drive builds, 5K per week starting WW30**
  - Splitting builds 50/50 - Seagate Wuxi vs Kaifa HSAs
  - Coordinating media to be same lot and sputter machine on both Grenada and Bacall builds in each WW
  - Prime suspensions in all builds
  - Evaluating with and without short GIO (4.5 hrs TT)
- **All processes and inspection plans are documented and agreed to through FOF cleaning (details available if needed)**
  - Only open item is at HGA ET and disk usage (under discussion with RHO) –
    - » HGA ET is the point for added contamination based on line mapping
- **Expect first results WW32 from LODT (delayed 1 week)**
  - WW32 will be first results with Short GIO
- LCO Support teams headed to China End of January

### First week cleanliness builds status:

- Wafer defect lost 1/3 of sliders
- Finding contamination on 1.5% (LE comb) in first batch inspections – will continue on with this week's builds, and address in following week's batch
  - Need confirmation on Bacall material availability, Grenada material running short
- Real data after pipe cleaner builds available WW35-36!

### Cleanliness builds - Changes & additional monitoring:

#### Slider:

- Post SCBD LE Wiping
- Post DEB 192kHz cleaning
- Post Polish 192kHz cleaning
- Soak block Polish / cleaning changes
- Additional Inspections (Visual, SeaTape, MSL)

#### HGA

- Additional Inspections (Visual, SeaTape, MSL)

#### HSA

- No Marposs
- Additional Inspections

#### FOF

- Long checklist of data reviews and big clean items

# NMD Code improvements (Core team input)

## **Activity 1 - PCO17.3A (New MQM):**

Feb 4 - Factory scheduled to start L-ODT demo build

Feb 8 - Finish L-ODT & publish results. If results look good, then:

**Feb 9 - Mass pro cut in.**

## **Activity 2 - JIT3 F3 code:**

Feb 6 - Start SIE & Reli testing

Feb 9 - Finish SIE & Reli testing

**Feb 10 - Mass pro cut in.**

## **Activity 3 - New Servo code:**

Feb 6 : Start Reli & SIE with code that looks best by monday, followed by 1 week to run, find issues, fix issues etc.

Feb 10 : we will have bench verification of either code - by Dave O LDV work & Bench signal analysis (Servo team / Abhay)

Feb 13 : Finish Reli & SIE successfully.

**Feb 14 : Push to implement in masspro.**

# TGA Fix Effectiveness

Failure Mode	Config	Fails	Total	Failure Rate
NMD	hga_vendor	A	0	4
		B(reclaim TGA)	1	51
		I	2	218
		M	0	16
		O	0	574
		N	2	87
		O	0	15
		R	0	7
		7	0	28

TGA subtotal from HGA vendor	Reclaim TGA(B)	1	51	1.96%
	Other TGA	4	949	0.42%

Fix Effectiveness	Sample Size	Number of Failures	Confidence Level	% Defect
	51	1	60%	3.926%
	949	4	60%	0.551%
	<b>Fix Validation =</b>			<b>85.95%</b>

Bai Tao

Seagate Confidential

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SN	PFL#	Failing Head	Symptom	ttf (hrs)
S1D0HH3Y	PFL-3305	1	Head Instability	53.7
S1F04WRR	PFL-3299	5	Head Instability	62.6
W1D0C9W4	PFL-3355	1	Head Instability	295.3
W1D09BNP	PFL-2954	1	Degraded Head	297.2
W1D0CA1T	PFL-3388	1	Degraded Head	162.3
W1E04V4X	PFL-3125	1	Degraded Head	151.5
Z1FOC5DK	PFL-3162	5	Degraded Head	411.8
Z1FOCM95	PFL-3094	2	Degraded Head	98.7
Z1FOELHT	PFL-3232	1	Degraded BER	56

- 9 degraded/unstable heads in ORT have caused the MTBF to drop.
- Previously, the AFR trajectory had closely mimicked the OEM RDT trajectory, but has diverged in the last two weeks or so.

#### Actions being pursued:

- Detailed Configuration Analysis:
  - RHO analysis complete (Brian Mangnuson). No clear configuration trend observed.
  - RMO analysis under way (Arhsee Lumbay).
- Drive CERT Analysis:
  - LCO team working – under way (Scott Deits, Krishnan S.).
- RHO upstream Spec Analysis:
  - 1<sup>st</sup> pass complete (Joel Nathe, Song Liu). Looks promising on 5/9 failures.

# Upstream Percentile Analysis (Some signatures seen in ISI testing)

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	AL506GQ9J1	AL507PHKJ1	AL509CQBI1	AL50BIF0V1	AL50EF73X1	AL50GA1IT1	AL50I2ASZ1	AL50MFHJL0	AL50PNYTH1
HD_SN	AL506GQ9J1	AL507PHKJ1	AL509CQBI1	AL50BIF0V1	AL50EF73X1	AL50GA1IT1	AL50I2ASZ1	AL50MFHJL0	AL50PNYTH1
SN	Z1F0C5DK	W1D09BNP	W1D0C9W4	S1D0HH3Y	W1D0CA1T	Z1F0CM95	Z1F0ELHT	S1F04WRR	W1E04V4X
PFL#	PFL-3162	PFL-2954	PFL-3355	PFL-3305	PFL-3388	PFL-3094	PFL-3232	PFL-3299	PFL-3125
Failing Head	5	1	1	1	1	2	1	5	1
Symptom	Degraded Head	Degraded Head	Head Instability	Head Instability	Degraded Head	Degraded Head	Degraded BER	Head Instability	Degraded Head
ttf (hrs)	411.8	297.2	295.3	53.7	162.3	98.7	56	62.6	151.5
Test Date	11/8/2011	10/25/2011	11/23/2011	11/30/2011	11/23/2011	11/19/2011	11/15/2011	11/12/2011	11/29/2011
RES	280.05	265.69	275.37	325.48	282.84	309.14	300.71	295.02	369.05
Pop_Percentile	P50-P75	P25-P50	P25-P50	P75-P90	P50-P75	P75-P90	P50-P75	P50-P75	P95-P99
AMP	17275.392	8452.229	11585.051	18257.144	10720.478	17242.874	9568.709	9710.117	9478.778
Pop_Percentile	P95-P99	P10-P25	P50-P75	P95-P99	P50-P75	P95-P99	P25-P50	P25-P50	P25-P50
ASYM	5.823	12.036	10.007	-0.058	-6.374	4.367	14.648	20.477	2.543
Pop_Percentile	P25-P50	P75-P90	P50-P75	P10-P25	P5-P10	P25-P50	P75-P90	P95-P99	P25-P50
BARK_JMP	3.244	3.436	3.157	1.608	3.573	3.502	5.814	5.383	3.93
Pop_Percentile	P25-P50	P50-P75	P25-P50	P5-P10	P50-P75	P50-P75	P75-P90	P75-P90	P50-P75
HYST_PCT	2.071	2.422	2.125	1.95	2.528	2.168	4.418	2.455	3.503
Pop_Percentile	P10-P25	P25-P50	P10-P25	P10-P25	P25-P50	P25-P50	P75-P90	P25-P50	P50-P75
MAX_SLOPE_AT	-17.955	-450.056	-529.993	-2.036	323.997	-351.961	-355.94	-18.078	-414.039
Pop_Percentile	P50-P75	P10-P25	P10-P25	P50-P75	P90-P95	P25-P50	P25-P50	P50-P75	P25-P50
MAX_SLOPE_PCT	84.023	238.539	174.285	78.867	98.949	174.017	187.694	237.798	244.93
Pop_Percentile	P10-P25	P75-P90	P50-P75	P10-P25	P25-P50	P50-P75	P50-P75	P75-P90	P75-P90
STD_MAX_SLOPE	0	0	0	0	0	0	0	0	0
Pop_Percentile	P1-P99	P1-P99	P1-P99	P1-P99	P1-P99	P1-P99	P1-P99	P1-P99	P1-P99
SMAN_AMP_AVG	385.532	494.666	380.258	398.364	1789.981	57.775	494.624	556.683	748.097
Pop_Percentile	P25-P50	P50-P75	P25-P50	P25-P50	P99	P25-P50	P50-P75	P50-P75	P75-P90
SMAN_MAX_MAX	615.541	756.056	501.859	714.404	2135.357	432.866	638.568	691.283	1101.95
Pop_Percentile	P50-P75	P50-P75	P25-P50	P50-P75	P99	P10-P25	P50-P75	P50-P75	P90-P95
SMAN_NORM	7.126	17.89	8.664	7.826	39.837	5.021	13.347	14.238	23.251
Pop_Percentile	P10-P25	P75-P90	P25-P50	P10-P25	P99	P1	P50-P75	P50-P75	P90-P95
HTR_RES	62.761	62.264	60.413	99.682	68.161	61.76	64.259	62.018	62.722
Pop_Percentile	P25-P50	P25-P50	<P1	>P99	P50-P75	P5-P10	P50-P75	P10-P25	P25-P50
SMTH_DTRND_MX_	28.35	43.628	7.018	27.693	7.58	24.704	21.844	29.249	37.429
Pop_Percentile	P75-P90	P95-P99	P1-P5	P75-P90	P1-P5	P50-P75	P50-P75	P75-P90	P90-P95
SMTH_DTRND_MX_	0.021	18.073	-13.948	60.082	-96.004	-67.974	-39.957	-18.078	-405.924
Pop_Percentile	P50-P75	P50-P75	P25-P50	P75-P90	P25-P50	P25-P50	P25-P50	P5-P10	P5-P10
MAX_STEP_PCT	-1.193	-6.017	4.551	-1.944	-2.84	-6.299	-3.63	-6.228	-5.664
Pop_Percentile	P50-P75	P5-P10	P75-P90	P50-P75	P25-P50	P5-P10	P25-P50	P5-P10	P10-P25
JUMP_CNT	0	1	0	0	0	1	0	2	0
Pop_Percentile	P1-P50	P75-P90	P1-P50	P1-P50	P1-P50	P75-P90	P1-P50	P90-P95	P1-P50
SPIKE_CNT	0	0	0	0	0	0	0	0	0
Pop_Percentile	P1-P75	P1-P75	P1-P75	P1-P75	P1-P75	P1-P75	P1-P75	P95-P99	P1-P75
BARKJMP_RMS	0.425	0.534	0.667	0.393	1.2	0.547	1.683	0.818	0.941
Pop_Percentile	P10-P25	P25-P50	P50-P75	P5-P10	P75-P90	P25-P50	P95-P99	P50-P75	P75-P90
WGHT_AVG_MX_SL	60.04	69.834	49.848	53.087	60.307	59.434	90.486	123.42	199.106
Pop_Percentile	P25-P50	P50-P75	P25-P50	P25-P50	P25-P50	P25-P50	P50-P75	P75-P90	P95-P99
JUMP_PCT_ATPKS	1.387	1.948	2.198	1.506	2.824	2.135	4.871	4.574	3.93
Pop_Percentile	P10-P25	P25-P50	P50-P75	P25-P50	P50-P75	P50-P75	P90-P95	P75-P90	P75-P90
JUMP_PT_AT_RPS	1.524	1.314	2.833	1.052	3.233	1.411	4.714	4.641	2.365
Pop_Percentile	P25-P50	P10-P25	P50-P75	P5-P10	P50-P75	P10-P25	P75-P90	P75-P90	P50-P75
JUMP_PT_AT_RPS	0.91	1.373	2.78	1.483	2.931	1.634	3.341	1.659	2.365
Pop_Percentile	P5-P10	P25-P50	P50-P75	P25-P50	P75-P90	P25-P50	P75-P90	P25-P50	P50-P75

- PFL-3388 has several parameters that exhibit outlier behavior.
- Extreme outlier for SMAN noise metrics.
- Should be amenable to easy upstream screening.
- RHO/Penang Teams looking at SMAN spec yield repercussions.
  - High confidence that a spec like SMAN\_AMP\_AVG > 1700 can be effected quickly.

Courtesy of Joel Nathe

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# Upstream Percentile Analysis (Some signatures seen in ET testing)

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Individual values vs. total Current Population				Individual values vs. total Current Population						
	AL506GG9J1	AL507PHKJ1	AL50GA1IT1		AL509CQBI1	AL50BIFOV1	AL50EF73X1	AL50I2ASZ1	AL50MFHJL0	
HD_SN	AL506GG9J1	AL507PHKJ1	AL50GA1IT1		SN	AL509CQBI1	AL50BIFOV1	AL50EF73X1	AL50I2ASZ1	AL50MFHJL0
SN	Z1FOC5DK	W1D09BNP	Z1FOCM95		PFL#	W1D0C9W4	S1D0HH3Y	W1D0CA1T	Z1FOELHT	S1F04WRR
PFL#	PFL-3162	PFL-2954	PFL-3094		Failing Head	PFL-3355	PFL-3305	PFL-3388	PFL-3232	PFL-3299
Failing Head	5	1	2		Symptom	1	1	1	1	5
Symptom	Degraded Head	Degraded Head	Degraded Head		ttf (hrs)	295.3	53.7	162.3	56	62.6
ttf (hrs)	411.8	297.2	98.7		Head Instability	Head Instability	Degraded Head	Degraded BER	Head Instability	
Test Date	11/19/2011	11/6/2011	11/27/2011		Test Date	12/15/2011	12/14/2011	12/15/2011	12/5/2011	12/24/2011
Test Type	PRODUCTION	PRODUCTION	PRODUCTION		Test Type	PRODUCTION	PRODUCTION	PRODUCTION	PRODUCTION	PRODUCTION
TSR Name	BMC6AL5P	BMC6AL5P	BMC6AL5P		TSR Name	BM20AL5P	BM20AL5P	BM20AL5P	BM20AL5P	BM20AL5P
TSR Num	null	45717	null		TSR Num	null	45844	null	null	
CTQ_AMP	15328.6271	8694.5689	17517.8731		CTQ_AMP	11138.9569	19667.1443	11060.0591	9347.9659	9229.1119
Pop_Percentile	P90-P95	P25-P50	P95-P99		Pop_Percentile	P50-P75	>P99	P50-P75	P25-P50	P25-P50
CTQ_ASYM	3.3131	10.2901	-4.8596		CTQ_ASYM	4.8465	-7.3379	-5.9912	5.2155	6.4179
Pop_Percentile	P50-P75	P95-P99	P1-P5		Pop_Percentile	P50-P75	P1-P5	P1-P5	P50-P75	P75-P90
CTQ_BER	-3.9487	-3.2487	-3.7058		CTQ_BER	-3.6846	-3.4995	-4.2502	-3.8097	-3.4072
Pop_Percentile	P25-P50	P75-P90	P50-P75		Pop_Percentile	P50-P75	P50-P75	P5-P10	P25-P50	P75-P90
CTQ_BSLN_NSE	0.889	1.0204	0.8826		CTQ_BSLN_NSE	1.1242	0.8037	0.8236	0.8365	1.0138
Pop_Percentile	P25-P50	P75-P90	P25-P50		Pop_Percentile	P95-P99	P1-P5	P5-P10	P10-P25	P75-P90
CTQ_CP_CAT	100	600	100		CTQ_CP_CAT	100	100	100	100	100
Pop_Percentile	P1-P75	>P99	P1-P75		Pop_Percentile	P1-P75	P1-P75	P1-P75	P1-P75	P1-P75
CTQ_CP_CLRNC	7.6881	8.2507	8.4352		CTQ_CP_CLRNC	9.3121	6.4447	7.6632	9.0226	8.8093
Pop_Percentile	P10-P25	P25-P50	P50-P75		Pop_Percentile	P90-P95	<P1	P10-P25	P75-P90	P75-P90
CTQ_HGA_ADC	0.9715	0.9632	1.0019		CTQ_HGA_ADC	1.0152	0.9999	0.9704	1.0072	0.9757
Pop_Percentile	P25-P50	P25-P50	P75-P90		Pop_Percentile	P95-P99	P75-P90	P25-P50	P75-P90	P25-P50
CTQ_HTR_RES	72.7251	72.5659	70.3701		CTQ_HTR_RES	70.9527	71.1653	74.8609	73.867	71.3238
Pop_Percentile	P95-P99	P90-P95	<P1		Pop_Percentile	P10-P25	P25-P50	>P99	>P99	P25-P50
CTQ_ISLTN	0	0	0		CTQ_ISLTN	0	0	0	0	0
Pop_Percentile	P1-P50	P1-P50	P1-P50		Pop_Percentile	P1-P50	P1-P50	P1-P50	P1-P50	P1-P50
CTQ_ISLTN_FLAG	0	0	0		CTQ_ISLTN_FLAG	0	0	0	0	0
Pop_Percentile	P1-P99	P1-P99	P1-P99		Pop_Percentile	P1-P99	P1-P99	P1-P99	P1-P99	P1-P99
CTQ_LRG_GLITCH	-3.6408	-3.6408	-3.6408		CTQ_LRG_GLITCH	-3.6408	-2.4357	-3.6408	-3.6408	-3.6408
Pop_Percentile	P1-P75	P1-P75	P1-P75		Pop_Percentile	P75-P90	P90-P95	P75-P90	P75-P90	P75-P90
CTQ_MOD	3.4228	5.2978	4.0758		CTQ_MOD	4.325	4.5186	6.5607	4.8086	5.7137
Pop_Percentile	P1-P5	P50-P75	P10-P25		Pop_Percentile	P25-P50	P25-P50	P90-P95	P25-P50	P75-P90
CTQ_NORM_NSE	0.0557	0.0676	0.0429		CTQ_NORM_NSE	0.0533	0.0858	0.0829	0.0598	0.0962
Pop_Percentile	P25-P50	P50-P75	P5-P10		Pop_Percentile	P25-P50	P50-P75	P50-P75	P25-P50	P75-P90
CTQ_NSE_DELTA	193.4454	27.3986	43.611		CTQ_NSE_DELTA	93.8405	397.1849	31.9965	-227.8628	-116.6536
Pop_Percentile	P75-P90	P50-P75	P50-P75		Pop_Percentile	P50-P75	P90-P95	P50-P75	P10-P25	P10-P25
CTQ_OVW	-40.6454	-31.9852	-39.1277		CTQ_OVW	-33.4324	-40.551	-41.9314	-36.5902	-37.8691
Pop_Percentile	P25-P50	P90-P95	P25-P50		Pop_Percentile	P75-P90	P25-P50	P10-P25	P50-P75	P50-P75
CTQ_POL	3.2904	2.4881	4.3332		CTQ_POL				3.599	
Pop_Percentile	P10-P25	<P1	P75-P90		Pop_Percentile				P25-P50	
CTQ_RD_RES	271.9942	264.685	317.0623		CTQ_RD_RES	282.7537	328.0096	287.8071	311.811	305.6733
Pop_Percentile	P25-P50	P25-P50	P75-P90		Pop_Percentile	P50-P75	P90-P95	P50-P75	P75-P90	P75-P90
CTQ_ROOT_YIELD	100	100	100		CTQ_ROOT_YIELD	100	100	100	100	100
Pop_Percentile	>P90	>P90	>P90		Pop_Percentile	>P90	>P90	>P90	>P90	>P90
CTQ_SRVO_LIN	0	1.2663	1.5837		CTQ_SRVO_LIN	1.1239	1.3145	1.3404	1.3458	1.3933
Pop_Percentile	<P1	P10-P25	P90-P95		Pop_Percentile	<P1	P10-P25	P25-P50	P25-P50	P50-P75
CTQ_WIJITA	2.9198	6.9852	3.9643		CTQ_WIJITA	4.427	15.5003	3.0936	4.548	4.2761
Pop_Percentile	P25-P50	P90-P95	P50-P75		Pop_Percentile	P75-P90	>P99	P25-P50	P75-P90	P75-P90

- PFLs-3305, 3299, 2954, and 3232 show multiple ET signatures.

- Should be amenable to Combo Specs.

Courtesy of Joel Nathe

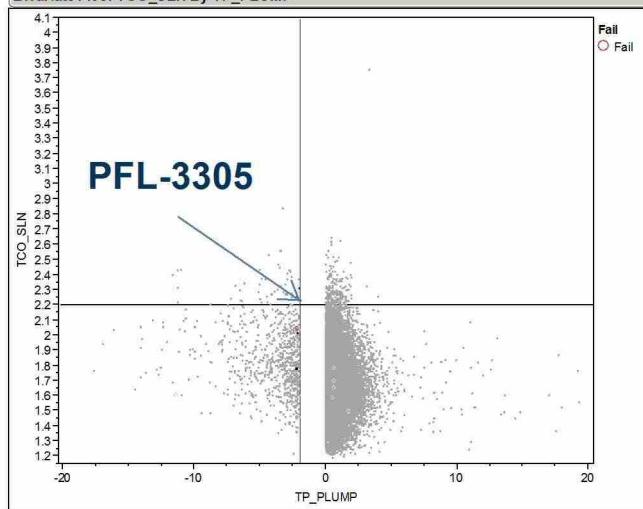
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# Upstream Percentile Analysis (Some signatures seen in ET testing)

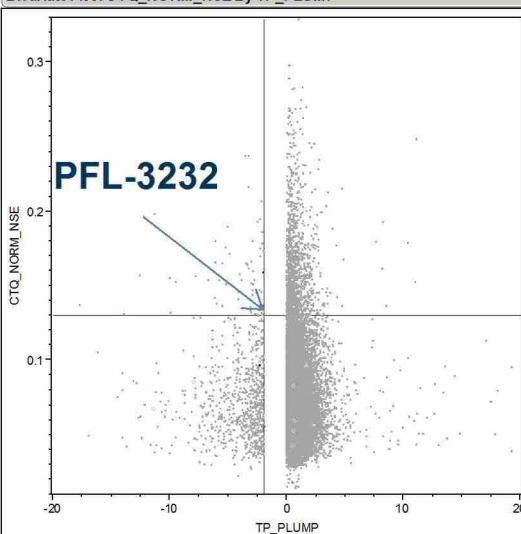
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Fit Y by X Group

Bivariate Fit of TCO\_SLN By TP\_PLUMP



Bivariate Fit of CTQ\_NORM\_NSE By TP\_PLUMP

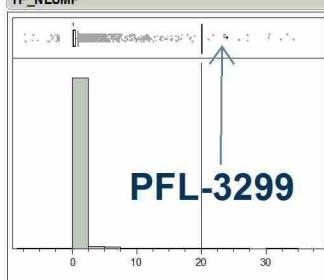


ET metrics implicated are traditional instability metrics.

- WIJITA: DC Bias Noise test. Catches instabilities well.
- Track Scan Lump metrics: Has been used to catch unstable heads on Manta Ray.
- SGRNH F3: SGRO Noise with heater enabled. A glitch metric in read-only mode.
- CTQ NORM NSE: Normalized Noise metric that usually highlights noisy heads.

Distributions

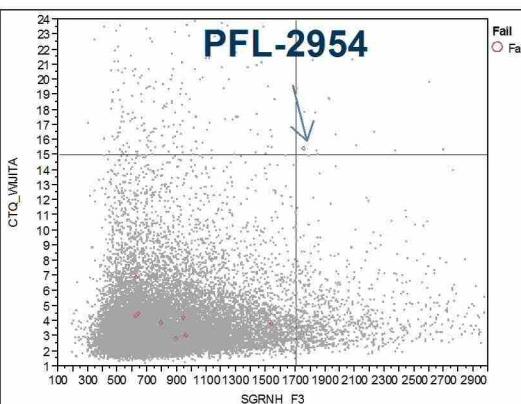
TP\_NLUMP



Quantiles

	maximum	Mean
100.0%	48.4286	0.4168077
99.5%	7.37873	1.3827503
97.5%	2.0879	0.0093147
90.0%	0.7822	0.4350651
75.0%	0.398	0.3985503
50.0%	median	0.1842
25.0%	quartile	0.07545
10.0%		0.029
2.5%		0.0068
0.5%		0.00102
0.0%	minimum	-58.678

Moments



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# Summary of ISI and ET Spec Proposals and Further Improvements planned

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SN	PFL#	Failing Head	Symptom	ttf (hrs)	HD_SN	Proposed Screening Location	Proposed Screen	Cum ET Yield Impact	ISI Yield Impact	Cut-In Date (Tentative)
S1D0HH3Y	PFL-3305	1	Head Instability	53.7	AL50BIF0V1	ET	TP_PLUMP(-2min) + TCO_SLN (2.2 max)	0.23%		Expect STTH cut-in on Feb 7
S1F04WRR	PFL-3299	5	Head Instability	62.6	AL50MFHJL0	ET	TP_NLUMP(20 max)	0.07%		Expect STTH cut-in on Feb 7
W1D0C9W4	PFL-3355	1	Head Instability	295.3	AL509CQBI1					
W1D09BNP	PFL-2954	1	Degraded Head	297.2	AL507PHKJ1	ET	WIJITA(15 max)+SGRNH_F3(1700 max)	0.08%		Expect STTH cut-in on Feb 7
W1D0CA1T	PFL-3388	1	Degraded Head	162.3	AL50EF73X1	ISI	SMAN_AMP_MAX > 1700 and SMANMAX_MAX_MAX > 2100		0.39%	Expect PNG cut-in by Feb 9
W1E04V4X	PFL-3125	1	Degraded Head	151.5	AL50PNYTH1					
Z1FOC5DK	PFL-3162	5	Degraded Head	411.8	AL506GQ9J1					
Z1FOCM95	PFL-3094	2	Degraded Head	98.7	AL50GA1IT1					
Z1FOELHT	PFL-3232	1	Degraded BER	56.0	AL50I2ASZ1	ET	TP_PLUMP(-2min) + CTQ_NORM_NSE(0.13max)	0.38%		Expect STTH cut-in on Feb 7

*Summary Table and Analysis Courtesy of Song Liu, Hoay Yoong Tan, Wailnn Choon*

- 4/9 ORT failures have specs identified at ET that target traditional instability/noise metrics.
- Net ET Yield penalty projected to be ~ 1%.
- 1/9 ORT failures have a strong signature at ISI in slider. Head is a very significant outlier for SMAN noise metrics. Net ISI Yield penalty ~ 0.4%.
- RHO agrees to implement Slider ISI and HGA ET specs ASAP.
- New TSR request to be released by Feb 3. Expect cut-in in STTH by Feb 7.
- ISI Spec request by NRM team on Feb 6. PNG team expected to implement by Feb 9 (PNG off Feb 6-7).
- Other Degraded Head / Instability mitigation activities:
  - Heater at ISI testing: Positive Drive Results. Immediate implementation to 100% gated by H/W.
    - 20% implementation by FW31 end.
    - 70% implementation by FW35.
    - 100% implementation by FW37.
  - Continued Upstream Specs: PFLs-2907 and 3059 are being closed via upstream ET and ISI specs independently.
  - HMRB9.7B Reader Migration:
    - 11% of MBS worth of wafers will be converted to new reader starting FW32.
    - Potential for 25% wafer conversion in FW37 with lead pi-lot demonstration and RGA.
    - 100% wafer expected in FW42 (NRM and STST).
    - Drive will begin to see significant HMRB9.7B flow in FW1309.

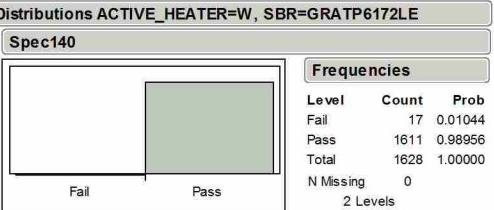
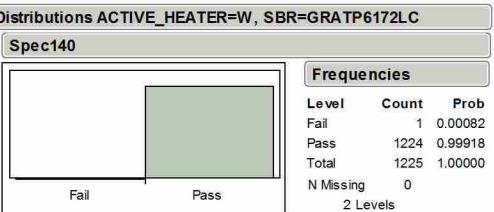
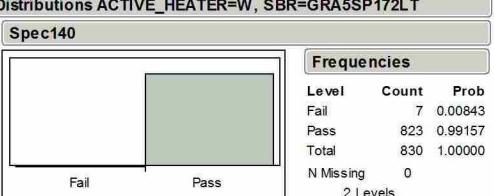
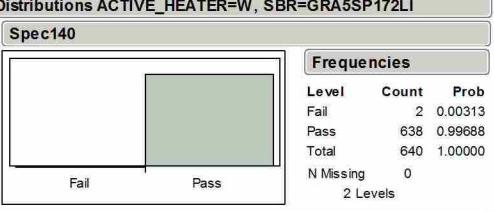
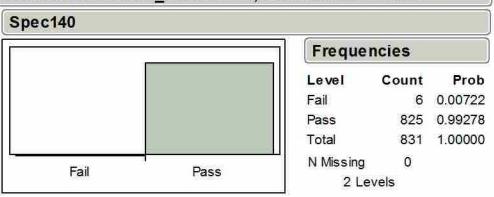
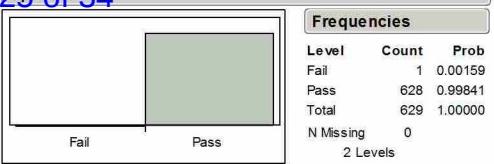
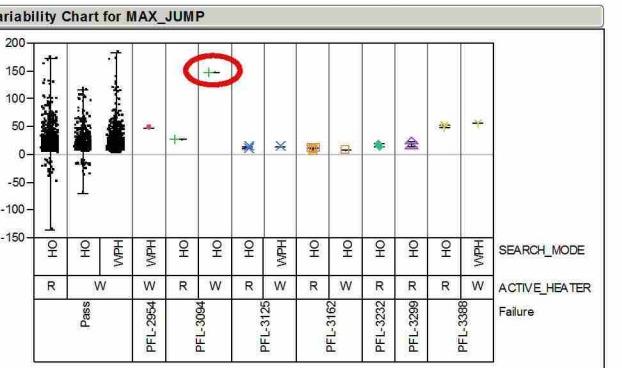
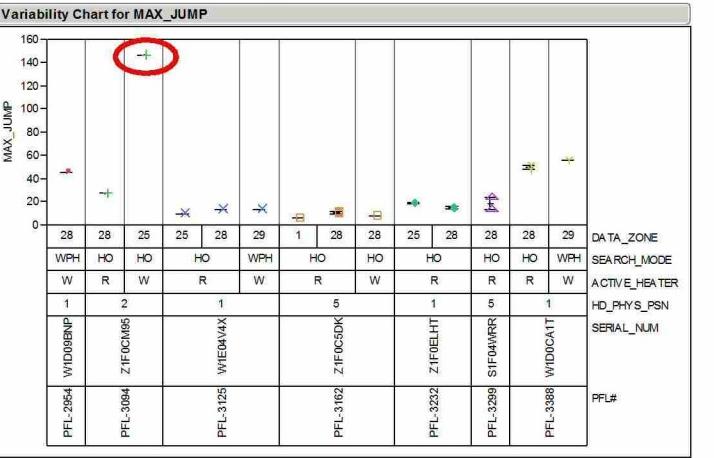
# CERT Analysis of the Failures: Baseline Jump Metric

Case 31674 v.00523-0 Document 184-30 Filed 07/26/18

Distributions ACTIVE\_HEATER=W, SBR=GRA5SP172LC

Spec140

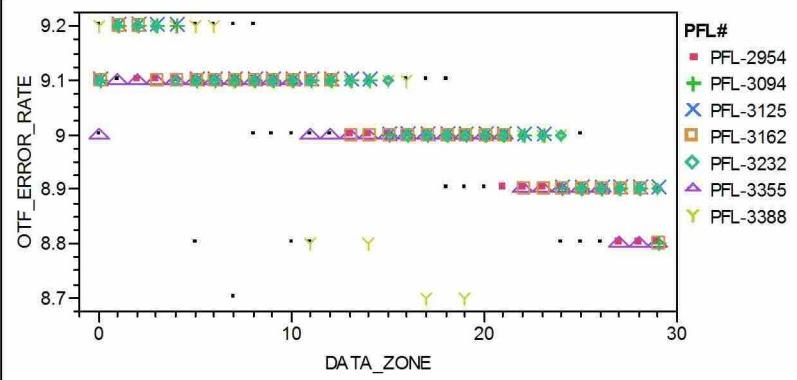
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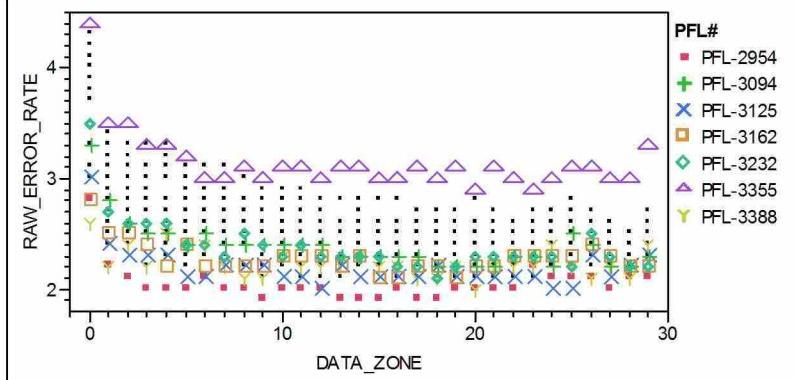
# CERT Analysis of the Failures: Raw and OTF BER in Serial Format

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Bivariate Fit of OTF\_ERROR\_RATE By DATA\_ZONE



Bivariate Fit of RAW\_ERROR\_RATE By DATA\_ZONE



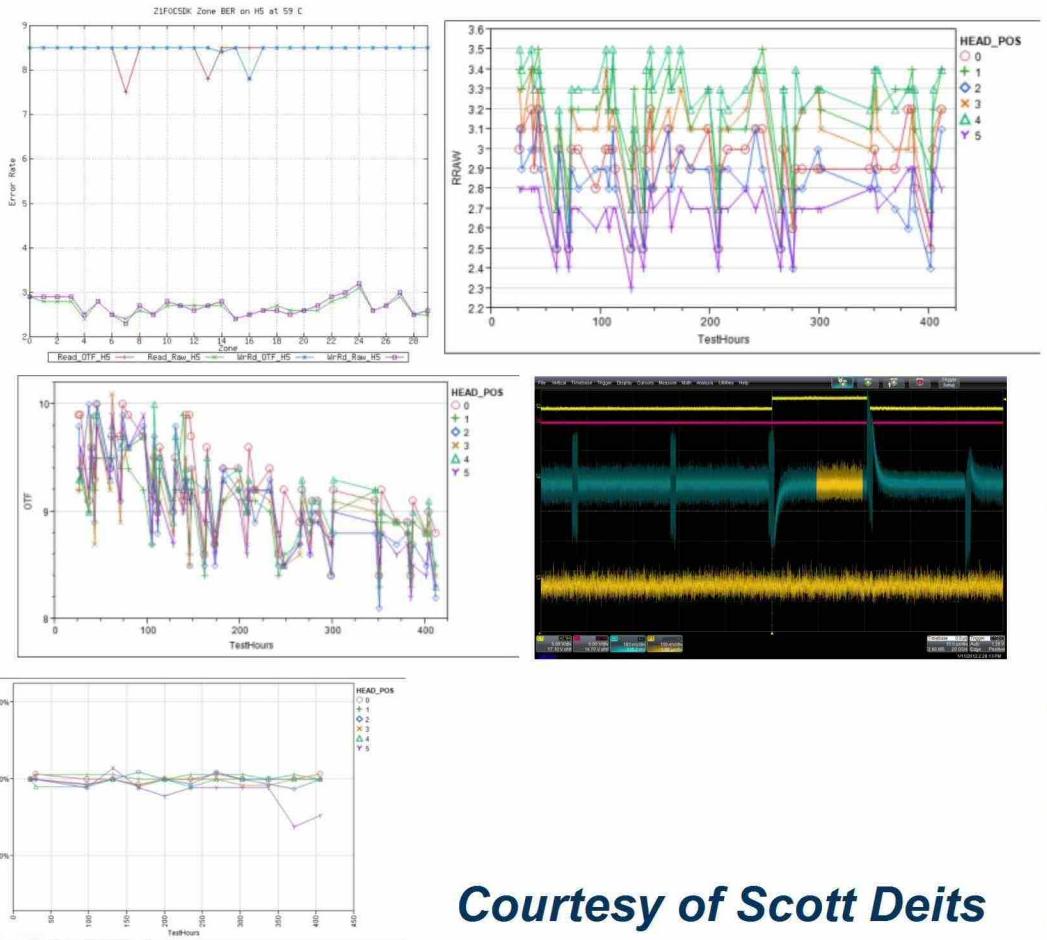
- Potential exists to remove PFL-2954 (Min Raw of 1.9 dcd), PFL-3388 (Min Raw of 2.0 dcd), and PFL-3125 (Min Raw of 2.0 dcd).
- May decide to do this ONLY for OEM (not for Disty).

# PFL-3162: Degraded Head; Reli and Bench Data

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- Z1F0C5DK
- Test Bed: FW1219-FW1226-DT
- Time To Failure: 411.82 Hrs
- EC10436 .FFFFFF EUP-D 55C/40%
- - Drive has 0 BBM(s), 42 ALT(s) and 134 CE entries.  
(Majority on Hd5)



Courtesy of Scott Deits

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outDrive	Head	Zone	Resistance	ATT2R	VGARap	VGARnow	dB_delt	NLFrap
NLFRow	NLFCol	NLFdelt						
Z1F0C5DK	0	16	287	2	289	277	-0.54	143
Z1F0C5DK	0	29	287	2	245	238	-0.29	139
Z1F0C5DK	1	0	325	2	277	239	-1.74	115
Z1F0C5DK	1	16	325	2	280	266	-0.62	117
Z1F0C5DK	1	29	325	2	284	264	-0.90	127
Z1F0C5DK	2	0	321	1	275	237	-1.78	140
Z1F0C5DK	2	16	321	1	213	199	-0.63	136
Z1F0C5DK	2	29	321	2	262	249	-0.57	129
Z1F0C5DK	3	0	256	2	336	248	-4.13	152
Z1F0C5DK	3	16	256	1	273	236	-1.74	152
Z1F0C5DK	3	29	256	1	259	236	-1.07	159
Z1F0C5DK	4	0	310	2	307	242	-3.04	151
Z1F0C5DK	4	16	310	1	281	265	-0.74	142
Z1F0C5DK	4	29	310	1	272	239	-1.53	135
Z1F0C5DK	5	0	265	2	285	378	4.38	109
Z1F0C5DK	5	16	265	2	283	407	5.83	121
Z1F0C5DK	5	29	265	1	224	335	5.25	153
Z1F0C5DK	5	29	265	1	224	335	5.25	147
Z1F0C5DK	5	29	265	1	224	335	5.25	125

#### ----- SYSTEM AREA READ-ONLY BER -----

Rbit	Hard	Soft	OTF	BER	Wbit	Whrd	Wrty
Hd 0	9.4	9.4	9.4	9.4	7.8	0.0	0.0
Hd 1	9.4	9.4	9.4	9.4	6.1	0.0	0.0
Hd 2	9.4	9.4	9.4	9.4	7.2	0.0	0.0
Hd 3	9.4	9.4	9.4	9.4	5.8	0.0	0.0
Hd 4	9.4	9.4	9.4	9.4	6.9	0.0	0.0
Hd 5	9.4	9.4	9.4	9.4	7.3	0.0	0.0

-Z1F0C5DK SYSTEM AREA WRITE/READ BER diode temp = 61C -

Rbit	Hard	Soft	OTF	BER	Wbit	Whrd	Wrty
Hd 0	9.4	9.4	9.4	9.4	7.4	2.7	2.7
Hd 1	9.4	9.4	9.4	9.4	6.3	2.7	2.7
Hd 2	9.4	9.4	9.4	9.4	6.6	2.7	2.7
Hd 3	9.4	9.4	9.4	9.4	5.7	2.7	2.7
Hd 4	9.4	9.4	9.4	9.4	6.5	2.7	2.7
Hd 5	9.4	9.4	9.4	9.4	7.2	2.7	2.7

- system track offset=0

- **Adaptives Check shows very significant amplitude increase and significant Asymmetry change relative to CERT.**
- **System Area BER does not show anything significant.**
- **OTF BER in Reli testing shows steady for all heads including Hd5.**
- **~6% Resistance drop for Hd5 in Reli at ~350hrs**

LAST_OP	STATUS		LAST_MOVE				FIRST_DATE					
SHP-Shipped	PASS		12/15/2011 17:11:05				12/01/2011					
PART_NUM	DESCRIP	BG	SBG		FGR	MODEL_NUM		CUSTOMER				
9YN166-300	?	MRW	GRA6S00066L		?	?						
PCBA Loop	HSA	RWK	ED	FDR	CA	AH	F	AP	HP	HGP	MP	VO
72171KWB	W218H00DKN	N	ED	FDR	CA	AH	F	AP	HP	HGP	MP	VO
30	12/11/11 15:34	TK1B09-A		NTF	0407	NBR	C A					
29	12/11/11 15:34	TK1B09-A		NTF	0407	NB	C A					
28	12/11/11 07:32	1B06A21		CMT	PASS	NB	C A					
27	12/11/11 06:50	TK410004 [154210]		CUT2	PASS	NB	C A	R				
26	12/10/11 21:26	TK410004 [154210]		CUT2	START	NB	C A					
25	12/10/11 21:24	TK410004 [154210]		FIN2	PASS	NB	C A	R				
24	12/10/11 19:13	TK410004 [154210]		FIN2	START	NB	C A					
23	12/10/11 19:12	TK410004 [154210]		CRT2	PASS	NB	C A	R				
22	12/10/11 14:16	TK410004 [154210]		CRT2	START	NB	C A					
21	12/10/11 14:10	TK410004 [192700]		FNC2	PASS	NBR	C A	R				
20	12/07/11 04:14	TK410004 [192700]		FNC2	START	NBR	C A					
19	12/07/11 04:12	TK410004 [192700]		CAL2	PASS	NBR	C A	R				
18	12/06/11 15:57	TK410004 [192700]		CAL2	START	NBR	C A					
17	12/06/11 15:55	TK410004 [192700]		PRE2	PASS	NBR	C A	R				
16	12/06/11 02:51	TK410004 [192700]		PRE2	START	NBR	C A					
15	12/05/11 08:35	1B01B12		DBOUT	PASS	NB	C A					
14	12/05/11 08:33	TK1B51		DBG	PASS	NB	C A					
13	12/05/11 07:21	1B04A81		AWDBG	PASS	NB	C A					
12	12/05/11 04:24	TK410005 [11600]		FNC2	10504	NBP	C A	R				
11	12/02/11 15:21	TK410005 [11600]		FNC2	START	NBP	C A					
10	12/02/11 15:19	TK410005 [11600]		CAL2	PASS	NBP	C A	R				
9	12/02/11 03:52	TK410005 [11600]		CAL2	START	NBP	C A					
8	12/02/11 03:50	TK410005 [11600]		PRE2	PASS	NBP	C A	R				
7	12/01/11 15:05	TK410005 [11600]		PRE2	START	NBP	C A					
6	12/01/11 14:25	1098PS8		SCREW	PASS	NBP	C A					
5	12/01/11 14:25	1B09B13		PWA	PASS	NBP	C A					
4	12/01/11 14:19	CRX109		CRX	PASS	NBP	C A					
3	12/01/11 14:19	LRT109 [1]		LRT	PASS	NBP	C A					
2	12/01/11 14:17	ULD109		ULD	PASS	NBP	C A					
1	12/01/11 14:16	RTP021		RTP	PASS	NBP	C A					

Serial Number: Z1F0C5DK

Site: Korat

5	5	21	17	25
5	5	22	17	25
5	5	23	17	25
5	5	24	17	25
5	5	25	29	25
5	5	26	31	25
5	5	27	17	25
5	5	28	29	23
5	5	29	31	26
5	5	30	28	25

P255\_FIR\_LSI\_DATA:

HD_PHYS_PSN	HD_LGC_PSN	ZONE	TDTARGR	TMPLR
5	5	0	11	155
5	5	1	10	142
5	5	2	9	141
5	5	3	11	158
5	5	4	10	144
5	5	5	9	134
5	5	6	10	142
5	5	7	9	146
5	5	8	7	125
5	5	9	10	147
5	5	10	11	154
5	5	11	11	159
5	5	12	11	161
5	5	13	11	157
5	5	14	11	158
5	5	15	11	155
5	5	16	9	142
5	5	17	10	146
5	5	18	9	136
5	5	19	9	144
5	5	20	10	156
5	5	21	9	145
5	5	22	11	156
5	5	23	11	157
5	5	24	11	156
5	5	25	11	154
5	5	26	10	145
5	5	27	9	136
5	5	28	10	149
5	5	29	10	148
5	5	30	8	125

P255\_NPTARG\_MISC\_LSI\_DATA:

HD_PHYS_PSN	HD_LGC_PSN	ZONE	TARG_TO	TARG_T
5	5	0	6	14
5	5	1	6	14
5	5	2	6	14
5	5	3	6	14
5	5	4	8	14
5	5	5	8	14
5	5	6	8	14

# Detailed Analysis of PFL-3162

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P255_PRECOMP_VGA_LSI_DATA:	HD_PHYS_PSN	HD_LGC_PSN	ZONE	LATE0R	LATE2R	LATE0F	LATE2F	ZFR	ZFAR	CTFRNGE	CTFR	ATT2R	VGARSH	VGA_TA_LPF	ATTC_RD
5	5	0		18	18	18	18	100	72	3	3970	1	317	1	2
5	5	4		16	16	16	16	107	71	3	3743	2	294	1	1
5	5	15		17	17	17	17	109	79	3	2957	2	271	1	1
5	5	25		17	17	17	17	100	70	2	2127	2	290	0	1
5	5	29		21	21	21	21	116	60	2	1653	1	298	0	2

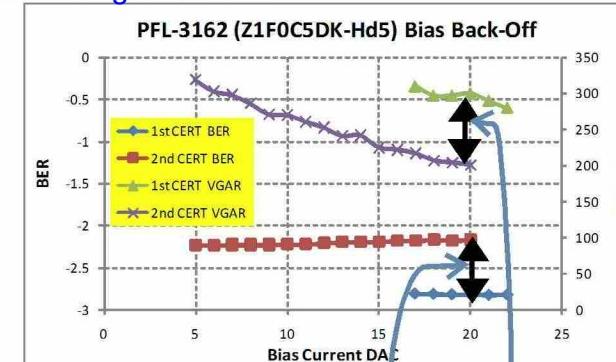
P255_PRECOMP_VGA_LSI_DATA:	HD_PHYS_PSN	HD_LGC_PSN	ZONE	LATE0R	LATE2R	LATE0F	LATE2F	ZFR	ZFAR	CTFRNGE	CTFR	ATT2R	VGARSH	VGA_TA_LPF	ATTC_RD
5	5	0		31	31	31	31	90	37	3	3594	1	216	1	3
5	5	4		28	28	28	28	102	42	3	3385	2	308	1	3
5	5	15		30	30	30	30	120	35	3	2807	2	303	1	3
5	5	25		30	29	30	29	125	50	2	1833	2	292	0	3
5	5	29		31	30	31	30	87	78	2	1377	1	274	0	3

P064\_SRVO\_FLAW\_HD:  
HD\_PHYS\_PSN HD\_LGC\_PSN RAW\_SRVO\_FLAW\_CNT SKIP\_TRACKS REFINED\_SRVO\_FLAW\_CNT HD\_STATUS

0	0	0	8	0	1
1	1	0	2	0	1
2	2	0	2	0	1
3	3	0	9	0	1
4	4	0	6	0	1
5	5	140	10005	140	1

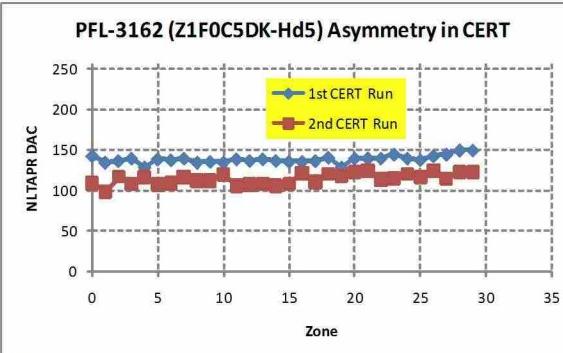
- Drive has significant loss in margin between 1<sup>st</sup> and 2<sup>nd</sup> CERT runs.
- In first CERT run, drive failed in FNC2 for EC10504 (too many servo defects).
- The drive was subsequently re-CERT'ed without rework.
- Clear indications of reader degradation between 1<sup>st</sup> and 2<sup>nd</sup> CERT runs.
- Increased Amplitude, Asymmetry change, and BER degradation (like bench FA) noted between 1<sup>st</sup> and 2<sup>nd</sup> CERT runs.
- Drive adaptation in 2<sup>nd</sup> CERT run very different from the 1<sup>st</sup> run and this is the reason the drive passed CERT.
- Very high likelihood that the head degraded during the 1<sup>st</sup> CERT run and continued to degrade during Reliability testing.

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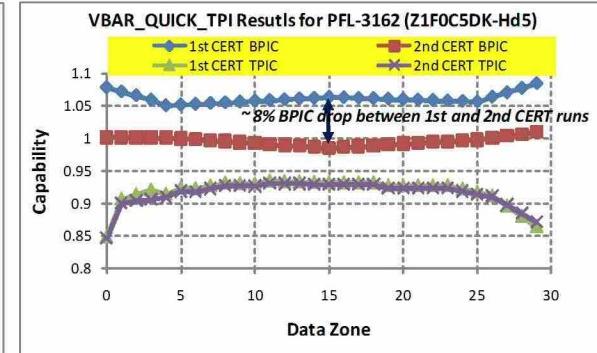


BER drop between  
1<sup>st</sup> and 2<sup>nd</sup> CERT runs ~ 0.7 dcd.

VGA drop between  
1<sup>st</sup> and 2<sup>nd</sup> CERT runs ~ 80 DAC.



Significant Reader Asymmetry change  
BPIC drop of ~ 8% between 1<sup>st</sup> and 2<sup>nd</sup> CERT runs.



BPIC drop of ~ 8% between 1<sup>st</sup> and 2<sup>nd</sup> CERT runs.

- Corrective Action for this will need to include possibly modifying the ADG rules for this failure to include a mandatory head land possibly

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# Summary of Findings

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SN	PFL#	Failing Head	Symptom	ttf (hrs)	HD_SN	Proposed Screening Location	Proposed Screen(s)	Yield Impact at Location	Cut-In Date (Tentative)
S1D0HH3Y	PFL-3305	1	Head Instability	53.7	AL50BIFOV1	ET	TP_PLUMP(-2min) + TCO_SLN (2.2 max)	0.23%	Expect STTH cut-in on Feb 7
S1F04WRR	PFL-3299	5	Head Instability	62.6	AL50MFHJL0	ET	TP_NLUMP(20 max)	0.07%	Expect STTH cut-in on Feb 7
W1D0C9W4	PFL-3355	1	Head Instability	295.3	AL509CQBI1				
W1D09BNP	PFL-2954	1	Degraded Head	297.2	AL507PHKJ1	ET	WIJITA(15 max)+SGRNH_F3(1700 max)	0.08%	Expect STTH cut-in on Feb 7
W1D0CA1T	PFL-3388	1	Degraded Head	162.3	AL50EF73X1	ISI	SMAN_AMP_MAX > 1700 and SMANMAX_MAX_MAX > 2100	0.39%	Expect PNG cut-in by Feb 9
W1E04V4X	PFL-3125	1	Degraded Head	151.5	AL50PNYTH1				
Z1FOC5DK	PFL-3162	5	Degraded Head	411.8	AL506GQ911	Drive ADG	Possibly prevent reCERT for EC10504 along with other potential ECs	None	TBD
Z1FOCM95	PFL-3094	2	Degraded Head	98.7	AL50GA1JT1	Drive CERT	MAX_JUMP>140 in P135_AGC_BASELINE_JUMP for ACTIVE_HEATER=W	~ 1%	TBD
Z1FOELHT	PFL-3232	1	Degraded BER	56.0	AL50I2ASZ1	ET	TP_PLUMP(-2min) + CTQ_NORM_NSE(0.13max)	0.38%	Expect STTH cut-in on Feb 7

- Coverage so far exists on 7 out of 9 failures – includes ISI, HGA ET, Drive specs, and Drive ADG rule changes.
- 3 of the failures can also be screened with a Raw BER spec in **P\_FORMAT\_ZONE\_ERROR\_RATE** (Fail if < 2.1).
  - Yield impact under assessment.
  - 2 of these overlap with ISI and ET spec (PFL-2954, PFL-3388).
  - PFL-3125 can additionally be caught with Raw BER spec that has no coverage elsewhere.
  - Decision will be made on Raw BER spec after CERT process is reviewed and ADG rules checked for these.
  - Potential exists for coverage of 8/9 failures.

# GIO Slot Analysis

LCO process team identified five Bacall drives failed in Wuxi for EC13069(DST long failure) which also involved movement of neighboring slot during GIO

Data is limited to only five drives due to short retention of factory process data

Some slots experienced multiple neighboring tray gantry movements

Operation of failing HDD while neighboring slot tray is moved	No Movement	ATI Test @ OD	Sequential Write	Sequential Read
Number of events	3	3	1	1

- Correlation of the failures to Gemini slot interaction is not possible on the first batch as the failures bypassed FA.
- The drives were reworked and reprocessed.
- This process is a deviation from normal ODT process.
- Currently, first time LODT failures are reworked and/or processed without FA.
- Only the second LODT failure are routed to FA.
- Proper FA is essential in correlating the stressor to NMD's.

## Important Note

Both ATI Test and Sequential Write are considered high write duty cycle tests.  
Dither and DOS activities can be invoked frequently during these operations

# NMD Code improvements (Core team input)

Activity 1 - PCO17.3A (New MQM):

Feb 4 - Factory scheduled to start L-ODT demo build

Feb 8 - Finish L-ODT & publish results. If results look good, then:

Feb 9 - Mass pro cut in.

Activity 2 - JIT3 F3 code:

Feb 6 - Start SIE & Reli testing

Feb 9 - Finish SIE & Reli testing

Feb 10 - Mass pro cut in.

Activity 3 - New Servo code:

Feb 6 : Start Reli & SIE with code that looks best by Monday, followed by 1 week to run, find issues, fix issues etc.

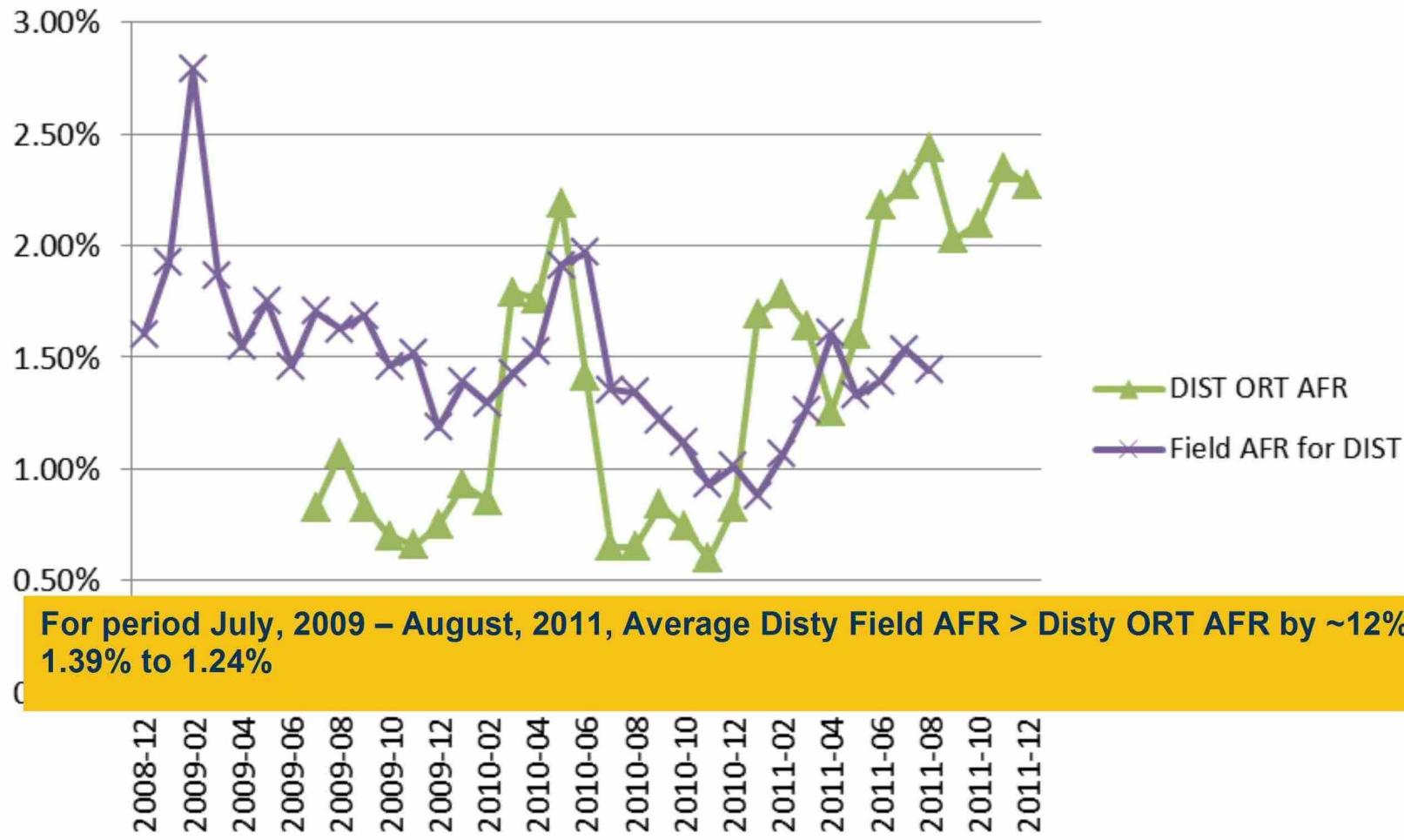
Feb 10 : we will have bench verification of either code - by Dave O LDV work & Bench signal analysis (Servo team / Abhay)

Feb 13 : Finish Reli & SIE successfully.

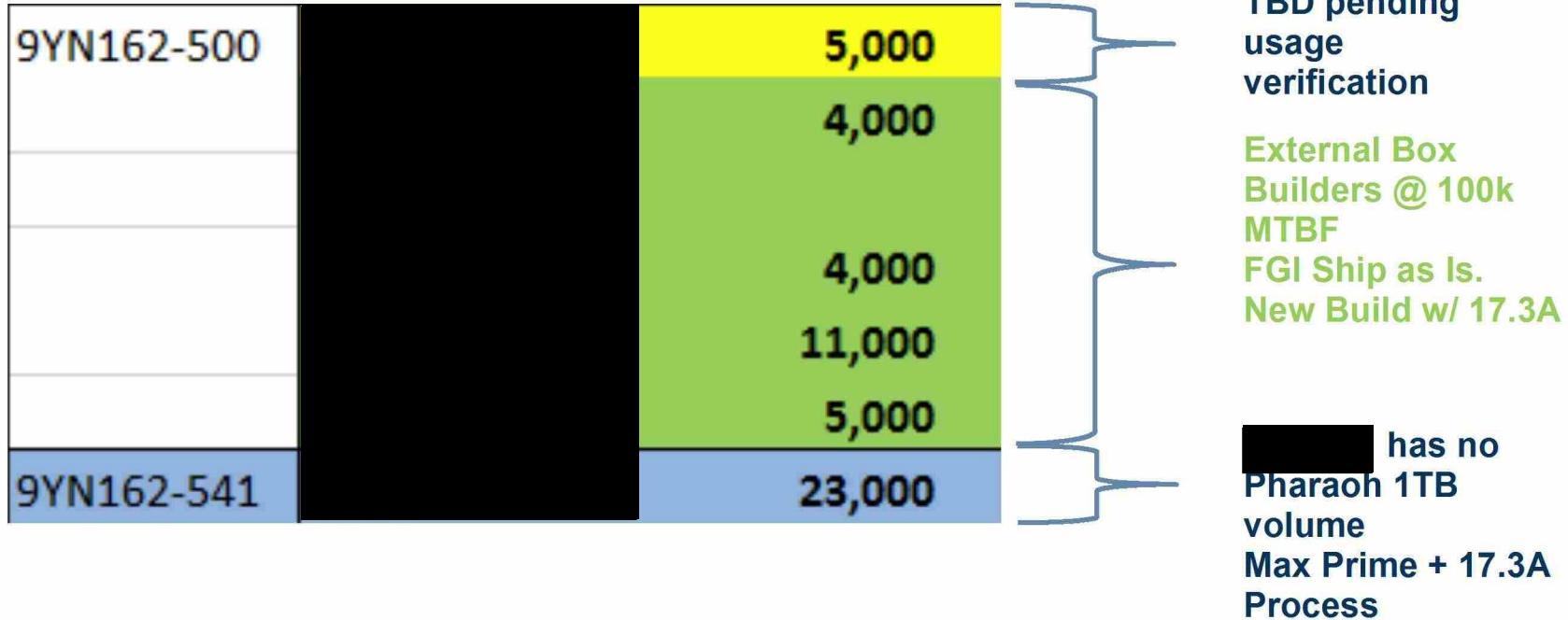
Feb 14 : Push to implement in masspro.

# Pharaoh ORT Disti AFR to Field AFR

## Pharaoh ORT DISTI AFR vs Field DISTI AFR



# WW32 1TB OEM Shipments



Many OEMs (including [REDACTED]) are buying from channel today.